

Speaker Bios

Tarek Abdallah is an Electrical Engineer, Energy Branch, Construction Engineering Research Laboratory, Department of Defense. He is responsible for overseeing Fort Future electrical model and development of fast decoupled power flow solutions for three-phase distribution networks. He analyzes capacity availability, single-point vulnerabilities, optimal DG device orientation, and load estimation at Army installations. Other work includes optimizing base camp strategy for using portable and host-nation electrical systems. Previous responsibilities consisted of design of fly-back power converters; analysis of losses in ferro-magnetic cores driven with a variety of high-frequency, non-sinusoidal waveforms; and extensive work in optimization of power-conversion circuits including buck converters and fly-back converters. Performing Intel Corporation funded-work, he searched for optimal design techniques to minimize power losses in transformers and power converters for computer processors and other power-intensive devices. He specifically dealt with winding, dc, and eddy-current losses. He earned an M.S. in Electrical Engineering from Dartmouth College and a B.E. in Electrical Engineering from Marquette University.

Jill Adelstein has been working on module and system reliability at the National Center for Photovoltaics at the National Renewable Energy Laboratory in Golden, Colorado since December 2001.

Abbas Akhil is a Principal Member of Technical Staff at Sandia National Laboratories in the Energy Storage and Distributed Energy Resources department. He made significant contributions in the establishment of the Distributed Energy Technologies Laboratory at Sandia Labs. He was the co-lead for the Distributed Energy Resources Group of CERTS and co-authored the MicroGrid concept and the whitepaper. Prior to that, he worked in the Energy Storage Systems Program where he performed system studies with electric utility partners to quantify the benefits of energy storage in applications other than traditional load leveling. These studies led to the development of smaller, modular energy storage systems including the award winning PQ2000 and the battery energy storage systems in Vernon, California and Metlakatla, Alaska. Prior to joining Sandia National Laboratories Mr. Akhil was employed by the Public Service Company of New Mexico for 13 years. He had a broad range of assignments in the Resource Analysis Group, including serving on EPRI research advisory committees and managing the internal R&D Program.

Charles Andraka Chuck earned his BSME and MSME at Virginia Polytechnic Institute and State University, and in 1998 earned a certificate in Scientific and Engineering Computation, at the University of New Mexico. Chuck has worked in Solar Thermal Energy Research and Development (now Concentrating Solar Power, or CSP) at Sandia National Laboratories since 1984, concentrating on dish/engine component and system development. He has led and worked on diverse projects, including "liquid metal thermal-to-electric converter" (LMTEC), advanced heat pipe receivers, dish component development, and finally dish systems development. Since 1998, Chuck has been involved in the highly successful "Advanced Dish Development System", "ADDS", at Sandia. This 10kW system incorporated the "best available technology" in all aspects. He has worked in developing and improving these systems, both on- and off-grid, in the areas of optics, controls, materials, and processes. These systems continue to operate daily.

Sandra Begay-Campbell is a Regent for the University of New Mexico and is the former executive director of the American Indian Science and Engineering Society (AISES), a non-profit organization whose mission is to increase the number of American Indian scientists and engineers. Sandra returned to Sandia National Laboratories where she is a Principal Member of the Technical Staff. Currently, Sandra leads Sandia's technical efforts in the Renewable Energy Program to assist tribes with renewable energy development. In 1987, Sandra received a Bachelor of Science - Civil Engineering degree from the University of New Mexico. She worked at Lawrence Livermore National Laboratories before she earned a Master of Science - Structural Engineering degree from Stanford University and she also worked at Los Alamos National Laboratory. Sandra served on the national Board of Directors for Women in Engineering Programs & Advocates Network (WEPAN). In 2000, Sandra was a recipient of Stanford University 2000

Multicultural Alumni of the Year Award and she was also selected as a recipient of the Governor's Award for Outstanding Women from the New Mexico Commission on the Status of Women. In September, Sandra was awarded the 2003 Women of Color Emerald Honor for Community Service during the Third Annual Women of Color Research Sciences and Technologies Awards Conference.

Bill Black is a senior member of the technical staff at Sandia National Laboratories. Mr. Black joined Sandia in 1988 and is a project manager for several distributed energy projects at Sandia. He is also a Certified Energy Manager. He has worked in several areas during his career at Sandia including the Photovoltaic Systems Department and several security system technology development groups. His experience includes electro-mechanical system design and electronic hardware and software development.

Ward Bower, Principal Member of the Technical Staff, has been with Sandia National Laboratories for 40 years and has participated in PV inverter and balance-of-system development work since 1978. He has led inverter, charge controller and other balance-of-systems development/evaluations, system development, and evaluation facilities. He has provided PV applications assessments in remote areas including the South Pole, Alaskan villages, the Marshall Islands and India others. He is currently a voting member of Code Making Panel #13 for the National Electrical Code. He currently serves as Chairman of the PV Industry Forum for Article 690, "Solar Photovoltaic Systems", to propose changes to the Article for PV system installations. That forum has organized over 60 members of the PV industry, universities and utilities to provide their expertise to code issues. He is a member of the IEEE Standards Coordinating Committee SCC21 for PV standards. He also serves as the USA Technical Expert (alternate) on the Executive Committee and Task 1, "Grid Interconnection of Building Integrated and Dispersed PV Systems", for the International Energy Agency (IEA) implementing agreement on Photovoltaic Power Systems. Ward currently serves on the Board of Directors for the North American Board of Certified Energy Practitioners currently launching a national certification program for PV installers. He is also collaborating with industry to draft a new certification test protocol for PV inverters. Ward is leading the Sandia inverter development team for high-reliability inverter R&D contracts and is developing a 5-year program for inverter R&D for the solar program. He participates the US DOE Photovoltaic Manufacturing R&D (PVMan R&D) program with NREL. He has provided technical support and more than 60 papers as a balance-of-system, PV-safety, and National Electrical Code expert to organizations including the Solar Energy Industries (SEIA), Utility Photovoltaic Group (UPVG), NEC training classes, NJATC, IEEE Standards groups, American Solar Energy Society, and others.

John D. Boyes For the past six years, Mr. Boyes has managed the U.S. Department of Energy funded Energy Storage Systems Program at Sandia National Laboratories. Recently, he took on the responsibility of all Distributed Energy Resources programs at Sandia. This includes DER work for the DOE, collaborative projects with utilities and industry in design and testing at the Distributed Energy Technologies Laboratory, interfacing with the Sandia Secure SCADA Laboratory as well as managing the Energy Storage Program. John has been with Sandia for 25 years, managing programs and projects for the last 14 of those years. Prior to joining the Energy Storage Program he was involved in the design, construction and project management of multi-million dollar pulsed power test facilities and equipment and he was the Sandia Deputy Project Manager of the National Ignition Facility Project at Lawrence Livermore National Laboratory. Mr. Boyes has a Masters Degree in Mechanical Engineering from New Mexico State University.

B. Scott Canada is currently is a project engineer at the Arizona Public Service (APS) Solar Test and Research (STAR) facility in Tempe, AZ. Scott was raised and educated in Texas where he obtained a bachelor of science in chemical engineering from Texas Tech University in 1997. In 1999, Scott joined the APS STAR team where he has worked on a wide variety of solar electric projects and programs. These projects include both grid-connected and remote photovoltaic systems in a variety of applications and sizes. Currently, Scott is overseeing the installation of a 1 MWe solar tough plant south of Phoenix.

Gilbert E. Cohen is Vice President of Engineering and Operations at Solargenix Energy (formerly Duke Solar) in Raleigh, North Carolina. Mr. Cohen was the Technical Services Manager of KJC Operating Company, the operator of the most successful Solar Electric Generating Systems (SEGS) in the Mojave

Desert (California). His services at the SEGS spanned more than 14 years. Mr. Cohen's interest in Solar Energy began 25 years ago as a staff Engineer of the Scientific Research Foundation, where he was involved in various R&D activities. Mr. Cohen has authored and presented numerous technical papers at professional and academics organizations in many countries. He is an active member of the Solar Energy Division of the American Society of Mechanical Engineers (ASME), and of the American Solar Energy Society (ASES), presently serving his second term on the ASES Board of Directors. In 2002 Mr. Cohen received the prestigious "Hoyt Clarke Hottel Award" from the American Solar Energy Society. This award honors individuals who have made significant contributions to the technology in the solar energy field.

Marc Cortez is Director of Marketing at Shell Solar Industries. Mr. Cortez has been developing and marketing technology products worldwide for over 20 years, most recently as Director of Marketing for Shell Solar Industries. Prior to joining Shell, he was Business Development Manager for AeroVironment and was responsible for developing renewable energy products for North America, Europe and Africa. In a previous capacity, Mr. Cortez helped the former Soviet Union transition from defense to commercial-related industries by creating over 30 joint ventures between North American and Russian companies. He has a BS in Mechanical Engineering from Colorado State University and an MBA from Pepperdine University.

Richard B. Diver has been involved in the development of Concentrating Solar Power technology since 1976. He joined Sandia National Laboratories in 1984 and has been responsible for solar receiver technology development; project manager of Dish/Stirling Joint Ventures with Cummins Power Generation; and concentrator technology development activities. Currently he is project lead for the Advanced Dish Development System and solar thermochemical hydrogen investigations at Sandia. He received his Ph.D. and M.S. in mechanical engineering from the University of Minnesota and his B.S. from West Point. While at Minnesota he directed the design and construction of a solar furnace facility, which he used for experimental studies of high-temperature solar thermochemical processing.

James P. Dunlop is a Principal Engineer at the Florida Solar Energy Center (FSEC), a research institute of the University of Central Florida. Since joining FSEC in 1985, his primary activities have included the design, analysis and implementation of advanced energy systems, energy conservation and alternative energy technologies, especially for photovoltaic (PV) systems. Mr. Dunlop has been involved in all areas of PV technology development including the testing of hundreds of systems and components in the laboratory and field, the development of practitioner and hardware certification program standards, providing technical assistance to many end-user groups, and the delivery of numerous training programs throughout the U.S. targeting hundreds of individual contractors, journeymen and design professionals. Currently, his primary responsibilities are as manager of the U.S. Department of Energy Photovoltaic Southeast Regional Experiment Station, which FSEC has operated since 1982. He also serves as chairman of the technical committee for the North American Board of Certified Energy Practitioner, which is developing national standards for PV installer practitioner certification. He holds a BS in Engineering Science from the University of Florida, and is a licensed professional engineer and certified contractor in Florida.

Hunter Fanney joined the National Bureau of Standards as a mechanical engineer in the Solar Thermal Group in 1977, where he was project leader in conducting experimental and analytical studies of the thermal performance of solar water heating systems. In 1981, Fanney was awarded his doctorate in mechanical engineering by Virginia Polytechnic. He was appointed leader of the Solar Equipment Group in 1984, and later leader of the Heat Transfer group, with major thrusts in the area of heat transfer in building materials, development of test methods for residential water heaters, heat pumps and air conditioners, and the development of test methods, data, and prediction performance models for building-integrated PV. Prior to joining the National Bureau of Standards, Fanney worked at E. I. duPont de Nemours and Company. He is an active member of the American Society of Mechanical Engineers, serving on ASME's solar energy executive committee. He has been the recipient of ASME's "Best Paper Award." In 1996 he was co-recipient of the Federal Laboratory's Consortium's Excellence in Technology Transfer Award, recognizing accomplishments in transferring lab-developed technology. He has been selected by the National Society of Professional Engineers as the Department of Commerce's "Engineer of the Year."

Jerry Ginn is a senior member of the technical staff at Sandia. He joined Sandia in 1979. He has worked in the Photovoltaic Systems Evaluation (PSEL) Laboratory at Sandia since 1991, during which time he coordinated the establishment of a facility for testing standalone, grid-tied, and hybrid inverters. In his role as the lead instrumentation engineer at the PSEL, he has been responsible for the design of the data acquisition system, calibration of instruments, data acquisition, data reduction, and reporting. He expanded the capabilities of the facility to create Sandia's Distributed Energy Technology Facility (DETL) and is supporting that effort by consulting with a wide variety of distributed energy resource manufacturers, utilities, and private and government test facilities. He has extensive experience in measurement of power parameters associated with engine generators, photovoltaic arrays, power supplies, microturbines, fuel cells, utility power, and energy storage devices. Prior to his involvement in photovoltaics, his work experience included design of the power distribution system of a new power plant for an electric utility, design and operation of high voltage pulsed power accelerators, high voltage switch tube design and production for weapons systems, and design of special circuits for office products. Mr. Ginn earned an MS in Engineering from the University of Texas, 1979, and a BS degree in Electrical Engineering from Oklahoma State University in 1975.

Sigifredo Gonzalez is a senior member of the technical staff at Sandia National Laboratories, where he has worked since 1997. Mr. Gonzalez was recruited to assist in the evaluation of standalone and grid-tied Photovoltaic inverters. Mr. Gonzalez is responsible for programming the LabVIEW data acquisition programs for the grid-tied, hybrid, and standalone systems; he is an experienced computer programmer. He also has expertise in data acquisition systems, transducers, and system calibration. His most recent work assignment has been to evaluate the ability of grid-tied inverters to identify an interruption in the utility distribution system and disconnect from the utility when an interruption occurs. The result of this work was instrumental in the development of IEEE 929-2000. In the course of this work he has written software, installed hardware and data acquisition systems, and managed the data recording. He has extensive experience in programming arbitrary waveform generators, which are utilized for utility interaction tests, and surge equipment utilized in reliability tests. Gonzalez holds an MS in Electrical Engineering from New Mexico State University, 1996, and a BS in the same field granted by New Mexico Highlands University in 1994.

Charles Hanley received his Bachelor of Science degree in Engineering Science from Trinity University in San Antonio, Texas, and his M.S. degree in electrical engineering from Rensselaer Polytechnic Institute in Troy, New York. He came to Sandia National Laboratories in 1988, and has been working in Sandia's renewable energy programs since 1994. Until 2002, Charlie was involved in Sandia's international programs, managing the Mexico Renewable Energy Program, and then moving on to apply the Mexico successes in other parts of Central and South America. In managing these programs, Charlie has overseen the implementation of more than 400 stand-alone rural systems, including PV and wind water pumping and other facilities power applications. From 2000 to 2002, Charlie served a temporary position in Arlington, Virginia, with Winrock International. In the last year, Charlie has played a broader role in the systems-integration activities of Sandia's solar programs, principally working with the DOE

customer to develop a new multi-year technical plan and to implement the DOE's Systems-Driven Approach across the solar program.

Herb Hayden is a member of the Technology Development department at Arizona Public Service. APS is the largest and longest-serving electric utility in Arizona, and is a subsidiary of Pinnacle West Capital Corporation. Herb is responsible for the construction and operation of solar power plants for APS, with over 4.5 MW of photovoltaic (PV) solar plants, and over one megawatt being installed each year. One megawatt of solar thermal trough and additional dish engine projects are also in the planning stages. In addition, Herb manages the development of new solar technologies which has placed APS in a leadership role for distributed solar systems especially promising for utility use, such as high concentration PV, dish-engine, and larger-scale PV tracking systems. Herb is a PE in Arizona, having received his BSEE with honors from Arizona State University in 1983. Prior to his solar work at APS, Herb worked for Motorola in advanced electronic systems, and at APS in telecommunications systems.

Ray Hudson is Vice President of Advanced Technology for Xantrex Technology Inc. He works out of the Xantrex facility in Livermore, California. Previously, he held a variety of positions at Trace Technologies and Kenetech Windpower. He holds Bachelors and Masters degrees in Electrical Engineering from the University of Missouri at Columbia.

Jonathan W. Hurwitch is a Principal and serves as Chief Operating Officer of Sentech, Inc. – an energy and environment management consulting firm in Bethesda, Maryland. Sentech specializes in conducting technical, economic, policy, and communications studies for emerging distributed and alternative energy concepts for both government and commercial clients. Mr. Hurwitch is the Project Manager on the technical assistance contract for DOE/EERE's Deputy Assistant Secretary for Technology Development. Under this contract, Sentech provides technical and analytical assistance to many of the DOE energy efficiency and renewable energy programs including Solar, Wind/Hydropower, FreedomCAR, Hydrogen Fuel Cells and Infrastructure, Industrial Technologies, Buildings, and the Federal Energy Management Program. Hurwitch has assisted the US Department of Energy, Sandia, and the National Renewable Energy in solar energy for more than a decade focusing on the management and communications aspects of the programs. He has previously served on the Board of Directors of the Solar Energy Industries Association and the Solar Energy Research and Education Foundation. In 2003, he was asked to lead a task force to prepare an Integrated Solar Energy Multi-Year Technical Plan which included comprehensive perspective of all solar energy technologies and was consistent with the President's Management Agenda as directed by DOE/EERE. Mr. Hurwitch possesses a B.S. and M.S. in chemistry from the University of Miami (Fla.) and Georgetown University, respectively, and an M.B.A from the Virginia Polytechnic and State University (Virginia Tech). He currently serves on the Board of Directors of the National Hydrogen Association.

Scott A. Jones received his M.S. in Mechanical Engineering from the University of Minnesota in 1994 and has since worked at Sandia National Laboratories, where he is a Principal Member of the Technical Staff in the Energy Systems Analysis Department. His responsibilities include leading the power tower technology program and co-leading the systems analysis program for the DOE Concentrating Solar Power Program. Jones is on the Executive Committee of the ASME Solar Energy Division, and he previously served as the Chair of the ASME Solar Thermal Power Technical Committee.

Richard King is the Team Leader for the Photovoltaic R&D Program in the Office of Solar Energy Technologies, U.S. Department of Energy. As Team Leader, Mr. King manages a \$70 million research program to increase the performance and reduce the cost of clean, abundant solar electric technology. Research is conducted at national laboratories, industry and universities and ranges from basic research on solar electric semiconductor materials to system development, education and public awareness. Over the past 18 years at the Department, Mr. King has managed several design competitions to increase public education. These include the Sun Wall design competition, several solar car races and the newly created Solar Decathlon to design and build solar-powered houses. Mr. King holds a physics degree from the American University.

Greg Kolb has worked as a systems engineer at Sandia National Laboratories since 1978. Most of this time was devoted to the analysis of nuclear power plant safety and the R&D of large solar thermal power plants. This work was culminated with successful USA projects that significantly reduced operating costs at the 150 MW Kramer Junction solar plant, as well as the construction and startup of the next-generation Solar Two power tower. He is currently working on DoD-sponsored studies that should lead to the installation of several photovoltaic, daylighting, and solar heating projects on military bases.

James Maughan is the GE Global Research Center's business programs manager for GE Power Systems. In this role, James leads the Power Systems research efforts at GRC and acts as the primary liaison back to the business. James joined GE in 1989 as a research scientist for combustion technologies in the area of low emissions gas turbines. In 1997, James joined GE Power Systems where he held various positions in gas turbine, steam turbine, and new product development for Energy Services. In June 2002 he returned to GRC in his current role. James received his bachelor's degree in mechanical engineering from Brigham Young University and his PhD in the same discipline from Purdue University.

Peter McNutt works as a research engineer at the National Renewable Energy Laboratory's Outdoor Test Facility in the PV Systems Performance and Standards Task. He recently (September 2003) saw the completion of IEEE 1526, "Recommended Practice for Testing the Performance of Stand-Alone PV Systems," after working on the standard for five years.

Mark Mehos was hired by the National Renewable Energy Laboratory in 1986. He has led the High Temperature Solar Thermal Team at NREL since 1998 and has managed the Concentrating Solar Power Program since 2001. The primary objective of that team has been the development of low-cost, high-performance, and high-reliability systems that use concentrated sunlight to generate power, with an emphasis on large multi-megawatt parabolic trough systems and smaller kilowatt-scale concentrating photovoltaic systems. Mark has extensive project management experience including management of DOE's Concentrating Solar Power and Solar Buildings Programs at NREL as well as technical management of NREL's advanced optical materials, solar photocatalysis and dish/Stirling R&D activities. In 1991 he received an R&D 100 award for his work on the development of a pilot-scale solar detoxification test platform located at Lawrence Berkeley National Laboratory. Mark's technical skills include thermal and radiative transport computer modeling and analysis, combustion research and engineering, and engineering of photocatalytic systems. He works as a senior engineer, having earned a B.S. in mechanical engineering at the University of Colorado, and an M.S. in ME from the University of California at Berkeley.

Dave Menicucci is a research engineer at Sandia National Labs where he manages Sandia's Department of Defense energy support activities. He is an electrical engineer by training and has been at Sandia for twenty-three years where he has worked in both the photovoltaic and solar thermal research areas. In both the solar thermal and photovoltaic areas he has experience directing a wide range of applied research programs from megawatt scale solar electric generators to small, residential solar hot water systems. Prior to coming to Sandia, Dave worked in the environmental field in both public and private sectors, beginning as a meteorologist with the US Air Force. In addition, Dave has formal training in commercial marketing/sales and strategic planning and has consulted to private sector concerns in both areas.

David Mooney is a 15-year veteran of the renewable energy industry and is currently a senior project leader at the National Renewable Energy Laboratory. Dave returned to NREL a little more than a year ago after working in the private sector for seven years. For the year before returning to NREL, Dave served as interim executive director of a non-profit education corporation. Prior to that, he was the Director of Business Development for Spire Solar, a photovoltaic manufacturing equipment and systems producer. In that capacity, Dave was responsible for developing the domestic market for Spire's product line of turnkey PV module manufacturing and systems businesses. In this capacity, Dave had the lead responsibility for establishing Spire Solar Chicago, a partnership with the City of Chicago and Commonwealth Edison that has established a full service photovoltaic panel and systems manufacturing business on a former inner-city Brownfield. Still earlier, he began his career at NREL as a condensed

matter physicist researching photovoltaic materials. He moved from the laboratory to project management and was part of the team that launched PVMaT. After serving as a technical monitor on that effort, Dave was assigned to support the U.S. Department of Energy's efforts in renewable energy technology and trade. While on assignment to Washington, D.C., Dave worked directly with the office of the Secretary of Energy to assist in developing domestic and international renewable energy policies. These efforts included accompanying the Secretary on Presidential Trade Missions to promote U.S. energy technologies abroad. Upon returning to NREL's Colorado offices, Dave served as Assistant to the Director of NREL, where he aided the director in implementing laboratory strategy and served as liaison to the US DOE.

Larry Moore worked in the weapon and critical infrastructure organizations of Sandia National Laboratories prior to coming to the photovoltaic systems group in 1999. In the weapons areas, he managed diverse research programs in the material and energy sciences as well as working as a researcher conducting nondestructive testing of small explosive components. The focus of his work in the photovoltaic systems group has been working with fielded PV systems to determine system lifetimes and costs as well as system and component failure rates. Present efforts are supporting the Department of Agriculture Farm Bill and Rural Utilities Service work to make PV a practical energy option.

Craig O'Hare In January 2003, Craig O'Hare was appointed by Governor Bill Richardson as his Special Assistant for Renewable Energy in the Energy, Minerals, and Natural Resources Department. Craig is responsible for assisting in the implementation of the Governor's clean energy agenda, including: energy efficiency, renewable energy, alternative fuels, and the emerging promise of a hydrogen economy. Craig's particular focus is on the Governor's goals of making state government a national leader in energy and water resource efficiency, meeting at least 10% of New Mexico's electricity needs with renewable sources by 2010, and promoting energy efficiency in buildings through Green Building initiatives. Prior to his appointment, Craig worked for the City of Santa Fe's Water Division for six years as the Water Programs Administrator. In that capacity, Craig was responsible for the Water Division's media relations and public outreach, water conservation and efficiency programs, and drought emergency management. He also coordinated planning efforts with the Santa Fe National Forest on restoration of the fire-prone Santa Fe Watershed. Earlier professional involvement included serving as an Executive Assistant to a Tucson (AZ) City Councilmember and addressing water management for the Arizona Department of Water Resources. Craig has bachelors degrees in Business Economics and Geography from the University of California at Santa Barbara.

Michael J. Pelosi was born in 1967 in New Jersey, and grew up in Hawaii. He served in the Army in Germany and other stations for four years. Later he completed a combined Master's degree and Business and Public Administration. Pelosi's work background includes college teaching, politics, and management at Maui Electric in a solar energy program. He founded Maui Solar Energy Corporation in 1998 and now works full-time on software and hardware for the Solar Energy Industry. He was awarded a patent for a computer input device in 2002 that utilizes PV cells to sense motion. This product was recently selected for the Da Vinci Award given by the Detroit Engineering Society.

Hank Price is a senior engineer at NREL, and has been working on CSP technologies for the last 9 years. His current role is parabolic trough technology team leader for SunLab/DOE. Formerly he worked 9 years as a performance engineer at SEGS parabolic trough plants. Price earned an MS in Engineering from the University of Wisconsin, Madison, and a BS in Environmental Resource Engineering from Humboldt State University in California. He is a registered Mechanical Engineer in the State of California.

Michael A. Quintana is the Photovoltaics Technical Program Manager at Sandia National Laboratories. Mr. Quintana has 26 years experience with solar technologies, all at Sandia, with twelve years in photovoltaics. During his tenure in the photovoltaics program, Mr. Quintana's primary emphasis has been in the areas of reliability, manufacturing, diagnostics and performance of PV modules and systems. As a co-founder of the Module Degradation Research Cooperative, his work has been instrumental in raising the awareness degradation and failure mechanisms in the PV module industry and the research

community. Prior to his photovoltaics assignment Mr. Quintana was involved with studies of solar thermal systems and components.

Valerie Rauluk is the founder and Chief Executive Officer of Venture Catalyst Inc. ("VeCat"), a project development consultancy providing services to the public, private and non-profit sectors. VeCat specializes in the start-up and recreation of organizations, businesses, projects and issue campaigns. Key energy clients include the Clean Energy Corporation ("CEC") and the Greater Tucson Coalition for Solar Energy ("GTCSE"). VeCat provides strategic planning, program design and resource acquisition services to these organizations. Produced results for GTCSE includes securing over \$3 million in federal and local support for enhancing the regional solar energy industry and market. In addition to outreach campaigns for the hospitality industry and a solar home tour, results for CEC include the design and development of the Energy Surety Campaign. Ms. Rauluk has been in the enterprise development business for twenty-five years, guiding products, services, programs and projects from concept to full operation. Educated at the University of Chicago and New York University, she served as an investment banker in New York during the 1980s where she worked in mergers, acquisitions, leveraged buy-outs and industrial revenue bonds. Her experience also includes economic development for New York City minority businesses.

Miles Russell began his career in PV at the MIT Lincoln Laboratory back in 1977. He was a principal at the former Ascension Technology from 1986 through 1999 when the company was acquired by Applied Power Corporation. He has survived two further acquisitions and mergers and is now the Director of Product Development at RWE Schott Solar in Billerica, Massachusetts. Miles is rapidly becoming an old-timer in this industry.

Marjorie (Margie) Tatro is Director of the Energy and Transportation Security Center at Sandia National Laboratories, where she leads a group of approximately 120 people working to make the nation's energy and air transportation systems safer, more secure, and more reliable. She is responsible for a portfolio of programs that include a \$12M fossil energy program, a \$40M renewable and energy storage program, and \$5M of infrastructure programs (energy and transportation). Margie holds BS and MS degrees in mechanical engineering and has been employed by Sandia National Labs since 1985. She has worked in renewable energy research, facilities design, software design, and energy reliability groups while at Sandia. Margie is a member of the Central New Mexico Section of the Society of Women Engineers as well as the American Society of Mechanical Engineers and has served on the Board of Directors of the New Mexico Engineering Foundation.

Ernesto Terrado is with the World Bank in Washington, DC. He has worked in the fields of renewable energy, rural electrification, traditional fuels, and household energy for almost 30 years, 20 of which were spent as an energy specialist of the World Bank in Washington, DC. Prior to joining the Bank, Ernie managed the renewable energy program of the Philippines. While on staff at the Bank and now as a resident consultant, Ernie conducted technical and policy studies, and initiated or helped develop several Bank lending operations in renewable energy and offgrid rural electrification in Argentina, India, Nicaragua, the Philippines, Mexico and other countries. Ernie has a Ph.D. degree in chemical engineering from the University of Virginia.

Craig E. Tyner is currently manager of Solar Programs at Sandia National Laboratories, overseeing Sandia's Photovoltaics, Concentrating Solar Power (CSP), and Solar Buildings Programs and serving as a member of the Department of Energy's solar management team. He previously worked in the Concentrating Solar Power Program from 1985 to 2002, conducting research in various areas of power tower, solar detoxification, and solar chemistry technology (including solar thermochemical hydrogen research) before moving in 1989 to management positions overseeing those activities. From 1995 to 2002, he served as the director of the SunLab (Sandia/NREL virtual laboratory overseeing implementation of the CSP program for DOE) management team, coordinating SunLab's technology development, planning, and program implementation activities. In addition, Craig has served since 2002 as Chairman of the Executive Committee of the International Energy Agency's SolarPACES (Solar Power and Chemical Energy Systems) solar thermal working group. From 1994 to 2002, he was the Operating Agent for SolarPACES's Task I, Concentrating Solar Power Systems, coordinating the systems-level

cooperative technical activities of SolarPACES's 14 participating countries. Craig has a Bachelor's degree in chemical engineering from the California Institute of Technology and Master's and Ph.D. degrees in the same field from the University of Illinois. He has worked at Sandia since 1977, including 8 years in coal and oil shale research.

Charles Whitaker is a co-founder and VP of Engineering at [Endecon Engineering](http://www.endecon.com/) with a BS in Mechanical Engineering/Environmental Engineering and an MS in Mechanical Engineering. Working in renewable energy and distributed generation for over 25 years, Mr. Whitaker has been active in the evaluation of PV systems and components, documenting and disseminating their results, establishing and verifying performance claims, developing test procedures, and codifying them in domestic and international standards.

John Wiles is a Program Manager at the Southwest Technology Development Institute at New Mexico State University. He assists the Photovoltaic (PV) industry, electrical contractors, and electrical inspectors in understanding the PV requirements of the *National Electrical Code (NEC)*. John serves as Secretary for a National Fire Protection Association-appointed Task Group involved with Article 690 of the *NEC*. He drafted the text for Article 690 in the *2002 NEC Handbook*. He is primary author of an IEEE Standard on PV safety. He is author of a widely distributed manual published by Sandia National Laboratories entitled Photovoltaic Power Systems and the National Electrical Code: Suggested Practices. John conducts field work in balance of systems design for PV systems, acceptance testing of PV systems, test and evaluation of PV components, and the design and installation of data acquisition systems. He installed his first PV system in 1984 and lives in an off-grid, PV/wind-powered home (permitted and inspected, of course) with his wife Patti, two dogs, and two cats.